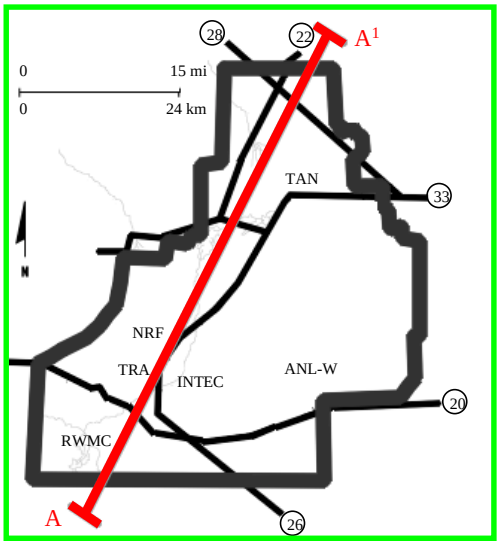
Vadose Zone Fact Sheet
Idaho National Engineering and Environmental Laboratory

Background: The Idaho National Engineering and Environmental Laboratory (INEEL) occupies 2,305 km^2 (890 mi^2) in southeastern Idaho, 51 km (32 mi) west of Idaho Falls, Idaho. INEEL is a multipurpose Department of Energy facility established to support engineering and scientific operations and research.

Issues: INEEL overlies the Snake River Plain Aquifer, a sole-source aquifer. A major area of concern is the Radioactive Waste Management Complex (RWMC), which includes Pit 9 and 19 other pits, 58 trenches, and 21 soil vault rows. Waste stored in these pits and trenches has resulted in vadose zone contamination. The percolation ponds at the Idaho Nuclear Technology Engineering Center (INTEC) are also a concern. Additional vadose zone contamination and migration can be minimized at INEEL if surface water infiltration can be controlled through installing engineered barriers, establishing surface water runoff/drainage controls, and eliminating discharges to percolation ponds.



Vadose zone infiltration: Natural recharge to the Snake River Plain Aquifer occurs in the northern portion of the site from rivers and streams, from spring snowmelt that accumulates in depressions, and with significant recharge from high runoff in the Big Lost River. Artificial recharge generally occurs at unlined percolation ponds, sewage lagoons, and injection wells.

Vadose zone characterization/remediation: Several actions have been completed, are under way, or are to be implemented in the near future. These include excavation of contaminated soil, installation of engineered or soil covers, and control of surface water runoff/drainage. Vacuum extraction of volatile organic compounds is ongoing at the RWMC and phytoremediation (using selected plants to extract contaminants from the soil) is being utilized at Argonne National Laboratory-West.

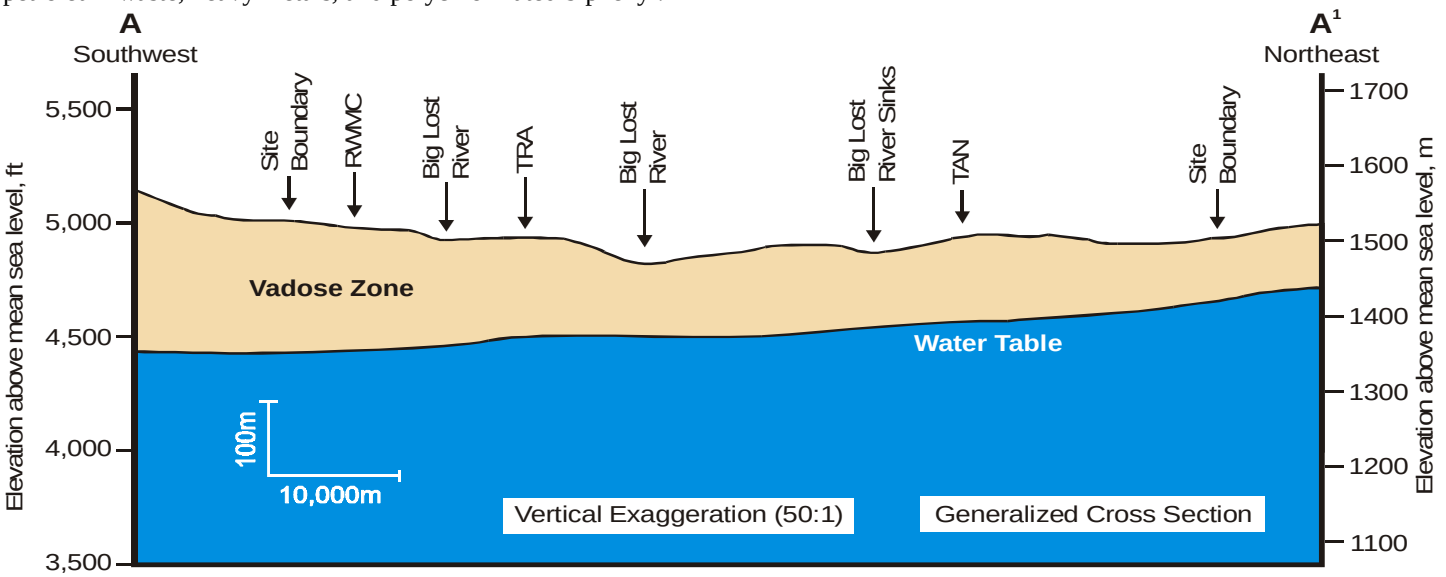
Precipitation: The average annual precipitation 21.6 cm (8.5 in).

Surface Water: Surface water includes streams and creeks that drain the mountain watersheds northwest of the site. The main watercourses are the Big Lost River, Little Lost River, and Birch Creek.

Geology: INEEL is located on the northern edge of the eastern Snake River Plain, a relatively flat plain with a relief of 1,207 to 1,408 m (3,960 to 4,620 ft). A 760 to 1,130 m (2,500 to 3,700 ft) thick sequence of fractured and permeable basaltic lava flows and poorly consolidated sedimentary layers underlie the INEEL.

Vadose zone thickness: Ranges from 60 m (200 ft) in northeast of the site to 305 m (1,000 ft) in the southeast.

Major contaminants of concern: Volatile and semivolatile organic compounds (primarily trichloroethylene), radionuclides, petroleum waste, heavy metals, and polychlorinated biphenyl.



September 2000

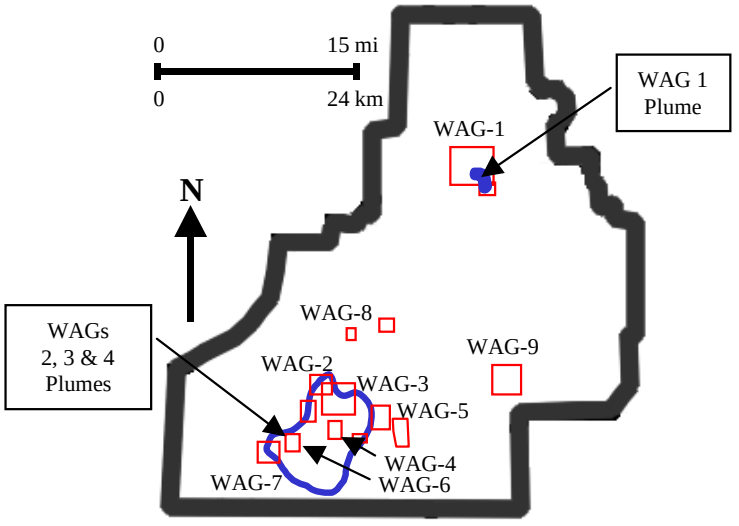
Ground Water Fact Sheet
Idaho National Engineering and Environmental Laboratory

Background: The Idaho National Engineering and Environmental Laboratory (INEEL) occupies 2,305 km^2 (890 mi^2) in southeastern Idaho, 51 km (32 mi) west of Idaho Falls, Idaho. INEEL is a multipurpose Department of Energy facility established to support engineering and scientific operations and research.

Hydrogeology: INEEL is located over the Snake River Plain Aquifer, a huge aquifer (approximately 320 by 80 km [200 by 50 mi]) that feeds into the Columbia River system. Regional ground water flow is to the southwest, with water velocities in the aquifer ranging from 1.5 to 4.5 m (5 to 15 ft) per year. Water velocities in perched zones and sedimentary interbeds range from virtually no movement to 300 m (1,000 ft) per year.

Issues: The Snake River Plain Aquifer is an Environmental Protection Agency designated Sole Source Aquifer and is a very important agricultural resource for irrigation wells for grain and potato crops. It is the "lifeblood" of southern Idaho and therefore INEEL has the responsibility to be a good steward.

Ground Water Characterization/ Remediation: INEEL is nearing completion of the characterization phase and entering into the remediation phase. Remedial alternatives include bioremediation, pump and treat, and monitored natural attenuation. Dense non-aqueous liquids (DNAPLs) are present at WAG-1.



Cumulative Extent of Contamination in Perched and Snake River Plain Aquifers

Ground Water Use: Ground water is currently used on and off site.

Plume Designation	Major Contaminants	Depth	Remedial Approach
WAG-1 (Source)	TCE; tritium; Cs-137; Sr-90	64 to 125 m (210 to 410 ft)	In-situ bioremediation
WAG-1 (Dissolved Phase)	TCE; tritium	64 to 125 m (210 to 410 ft)	Pump and treat; monitored natural attenuation
WAG-2	Tritium; Cs-137; Sr-90	24 to 36 m (80-120 ft)	Monitored natural attenuation
WAG-3 (Inside Fence)	Tritium; Am-241; I-129; Np-237; Sr-90; Tc-99; U-235; U-238	>137 m (450 ft)	To be determined
WAG-3 (Outside Fence)	Tritium; Am-241; I-129; Np-237; Sr-90; Tc-99; U-235; U-238	>137 m (450 ft)	Contingent pump and treat
WAG-4	Nitrate; lead	137 to 198 m (450-650 ft)	To be determined

TCE = trichloroethylene; Cs = cesium; SR = strontium; Am = americium; I = iodine; Np = neptunium; Tc = technetium; U = uranium